To: Dr. Penelope Latham, Inventory and Monitoring Coordinator
Pacific West RegionNational Park Service

From: Steven Schwarzbach, USGS, Western Ecological Research Center

Subject: Review of the Phase 2 monitoring plan for the San Francisco Bay Parks Network

I have read the Phase 2 report per your request and provide the following review comments.

The report lacks an executive summary but one is planned. The length of the document seems excessive but I suspect this is due to the need to conform to a mandated format.

I think the term monitoring should be defined on the first page. It was not.

There seems to be a dual purpose to the Inventory & Monitoring program, to pursue indicators of ecological condition or the "how's my ecosystem?" question and to pursue management effectiveness questions or "did our resource management policies achieve their objectives?" What the parks hope to accomplish is both. This sense of a multiple purpose monitoring effort has presented an enormous challenge to the designers of the program and not a little confusion to the workshop participants in attempting to select and prioritize "ecological indicators". I am confident this will eventually be sorted through but the process has lacked clarity of focus in the early stages. This seems especially true in chapter 2.

The parks also recognize, correctly, that activities outside the park boundaries impact what happens inside the park boundaries. This is elucidated on page 19 line 5 which notes the NPS has "therefore adopted a multi-faceted approach for monitoring park resources for integrated and threat specific monitoring".

For clarity I suggest : Insert the word categories on line 4 page 12 between the words "goals" and "guide" and change goals to goal.

Figure 1.1 provides a schematic relationship of resource monitoring to resource management. I would have liked to have seen more sub-boxes on resource management to reflect the concept of adaptive management. If no is the answer to Intervention needed then ….why keep monitoring? There could be good reasons but the flow chart doesn't reflect this complexity or even a choice. Monitoring just goes on…….unmodified. A good monitoring program needs to self evaluate, just as does resource management. What if no change is detected … the assumption is that the type II error is acceptable. No detectable change could mean an inadequate sampling effort. A decision could be made to stop monitoring or increase monitoring effort if design evaluation indicates insufficient power to detect levels of change that managers think are important.

Figure 1.4: This figure shows the park boundaries and an "outer boundary". This outer boundary seems completely arbitrary and does not seem to me to fit the descriptions in text regarding the mouth and center of San Francisco Bay. What is the real significance of this boundary. Is it drawn with this diameter to include Pinnacles? Does it have real meaning for the monitoring program?

Table 1.4 has a nice listing of public lands and adjacent to SFAN park units. A good addition to this table would be to identify monitoring efforts on these units and what long term data sets exist on them.

Page 39 has a section on anthropogenic threats……..it would be good to give the statistics on visitor use for each park in the network to put the 7 million people in the bay area into perspective on a park by park basis.

Table 1.8 lists impairments of waterbodies within the SFAN network. Mercury bioaccumulation in aquatic dependent resources associated with Tomales Bay should be added to the list on page 51 of water quality indicators.

Long term data sets are identified in a table1.13 but it is not clear how these data sets will factor into the decisions on what to monitor under the I&M process. Long term data sets and the protocols used to collect them need to be considered when establishing a new systematic program of indicators so that valuable past trend data is not lost.

Chapter 2 – Conceptual Models

This chapter has a lengthy but largely generic description of ecosystem drivers, and then a series of matrices. The principal result is a driver, stressor and indicator matrix at the end of the chapter that should be helpful in determining what to monitor…except it isn't. I have no idea what the monitoring questions would be when an x is in the box. The other problem I have with this as a conceptual model is that relationships are all two dimensional without notation of relative significance, and with no interactions. Are monitoring questions or vital signs identifiable through this model? Not that I can decipher, and I tried. I would like to see adaptive management added to the conceptual model. – not just the phrase but the process that better illustrates the interplay of monitoring and different components of "management" - Think of it as a conceptual model for management and a conceptual model for the ecosystem linked by monitoring.

What did the Network do right in chapter 2?
They identified important stressors, they considered varying scales of organization at the biological level and they organized around marine, freshwater aquatic and terrestrial systems. (Later on the freshwater aquatic component seems to get converted to wetlands in table 3.4 and wetlands is added as a "vital sign" as well but there is a disconnect on the details). Nice start but lots to do still on identifying the monitoring questions related to the conceptual model.

Section IV Chapter 3 – Vital Signs

3.1 states that vital signs may changes as management issues change…. – the process of choosing and modifying vital signs seems open ended. There is an inherent conflict between long term data gathering to assess status and trends and short term monitoring driven by management actions and issues. For many parks and even networks the management issues regarding resource management are well known and have not changed greatly. The notion that vital signs, once selected after an extensive vetting through this process, can be changed by a change in management emphasis or iterative process or whatever does not bode well for the creation of consistent long term data sets to assess status and trends in ecosystems. The notion that you can consistently do both things well is naively hopeful at best. It seems to me that direct management within a park takes higher priority to status and trends which may be related to actions both within and outside park boundaries, but the relative importance of the two approaches is never directly addressed by the I&M program, though the method of ranking gives a clue. The fact that legal mandates and management significance, which overlap in substance and that legal mandates was a ranking factor given only to NPS staff reinforces the notion that management not status and trends of an ecosystem, are the true higher priority of the I & M program for ranking vital signs in this network.

The prioritization process, particularly the vital signs prioritization meeting, attempted to adjust prioritization from the web ranking by looking at the network as a whole and primarily management related factors. The adjustments of these factors seemed logical. A new indicator, wetlands, was not even ranked by the process but was put in at #15. I was unclear however on what would actually be the monitoring question for this indicator. I had the same lack of clarity for Marine Oceanography. How does that differ from marine and estuarine fish and marine water quality? What is the monitoring question? Ozone was ranked #54 but air quality was adjusted up to #4. Protocols for ozone monitoring on vegetation are well established and done at other parks and networks. Why this one is so low and air quality so high is puzzling.

I was puzzled that the first 21 indicators were identified for implementation and protocol development yet, indicator 22, Dune and vascular plant assemblages is, I know, being worked on within the network by several partners. How does this relate to indicator # 11, plant community change at multiple scales? I know also that work is being done on # 27, Tule Elk, through NRPP this year. What other indicators are being worked on already at some scale by some partner or park? I would like to see more information on the indicator besides a title ……..such as a monitoring question, with information on who is gathering data or needs data on that question. While potential monitoring questions are listed in appendix 11 there is not consistency ……some indicators like “marine oceanography have a lot of questions at very large scales and others like natural lightscape have straightforward single questions. Some existing long term data sets were considered and itemized in a table and were perhaps verbally in the meeting to prioritize indicators but I did not see how this was considered more formally as a factor in the ranking of indicators. For status and trends this is very important though perhaps not as much with monitoring for management mandates.

table 3.4 presents indicators in the context of parks, resource realm and marine, terrestrial or wetland ecosystems but I'm not sure how this table is to be used or how indicators tie back to the conceptual model. Missing in particular is the linkage to the anthropogenic stressor portion of the conceptual model although this is where the management linkage to monitoring is of greatest importance.

Measurable attributes are still vague to me in regard to many of the vital signs.

For water quality monitoring, pollutants and waterbodies that exceed water quality standards are identified but threshold contamination values have not, particularly for bioaccumulative pollutants like methylmercury. The plan notes some interesting linkages of viruses and pinniped dieoffs that deserve to be pursued but is not clear if this will be done through research or monitoring, or both.

Synthesis comments:

There is an overwhelming amount of paper, process and verbiage to sort through but I am not convinced there is as yet a synthetic foundation for a status and trends monitoring program integrated with the resource needs of the network. The report seems geared to meet a set of requirements put upon the designers rather than something that has a natural flow.

A pretty comprehensive list has been generated and priorities have been set for implementation, yet some indicators being worked on are not on this list. The emphasis seems to be more towards management and this makes sense, but the promise of assessing long term status and trends seems more difficult to achieve with the approach being taken. This will be a coincidental outcome of overlap between indicators that have long term data already rather because long term data was emphasized. More explicit attention to what scale of data is suitable for long term trends and what the long term trends are would be beneficial to setting the questions of a long term monitoring program.